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Jon W Dudas

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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. EV 332498506 US

INVENTOR(S)

Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Gerald P.	Downey	Sterling Heights, Michigan

Additional inventors are being named on the _____ *separately numbered sheets attached hereto*

TITLE OF THE INVENTION (500 characters max)

Special Cam Bolt Assembly for Automotive Suspension Adjustment

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

☐ Customer Number:

OR

☑ Firm or Individual Name	Robert R. Collins				
Address	Reising, Ethington, Barnes, Kisselle, P.C.				
Address	P.O. Box 4390				
City	Troy	State	MI	Zip	48099-4390
Country	USA	Telephone	248 689 3500	Fax	248 689 4071

ENCLOSED APPLICATION PARTS *(check all that apply)*

☑ Specification *Number of Pages* 8

☑ Drawing(s) *Number of Sheets* 4

☐ Application Date Sheet. See 37 CFR 1.76

☐ CD(s), Number _____

☐ Other (specify) _____

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT

☑ Applicant claims small entity status. See 37 CFR 1.27.

☑ A check or money order is enclosed to cover the filing fees.

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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

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Respectfully submitted,

SIGNATURE _____

TYPED or PRINTED NAME Robert C. Collins

Date November 19, 2003

REGISTRATION NO. 27,430 *(if appropriate)*

Docket Number: 2504 PR 3006.001

TELEPHONE 248 689 3500

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***APPLICATION FOR UNITED STATES PATENT ***

[54] SPECIAL CAM BOLT ASSEMBLY FOR AUTOMOTIVE SUSPENSION ADJUSTMENT

[75] INVENTOR: Gerald P. Downey, Sterling Heights, MI

[73] Assignee: Alpha Stamping Company

[21] Appl. No.:

[22] Filed:

CLAIMS

What is claimed is:

1. A special cam bolt assembly comprising:

A specially formed bolt with an asymmetrical formed area integrated into the bolt shank. This formed area will appear immediately beyond the threaded end of the bolt and continue for a determined distance. This formed area will not distort or damage the threaded area of this bolt. The recommended shape of this form will be 4 sides of an incomplete hexagon. The two adjacent sides will be omitted to form the necessary asymmetrical locating shape. The flat areas of this shape will be equal to the diameter over the threaded portion of the bolt. The point areas of this shape will be created using the natural flow of metal when impacted in the bolt forming machine. The shank of the bolt will be formed complete in the bolt header machine using standard bolt manufacturing methods and will require no additional machining or processing to function as described.

An eccentric cam washer securely attached under the head of the bolt. This washer will be attached using the asymmetrical form on the bolt shank for location.

A second eccentric cam washer with a locating hole pierced into it that matches the asymmetrical shank of the bolt. When slid onto the special bolt shank this loose washer will match the radial location of the first washer that has been affixed beneath the head of the bolt.

A special design nut with a recess deep enough to allow the bottom surface of the nut to push the second loose eccentric cam washer over the asymmetrical formed shank area of the bolt. This recess will be engineered for thread engagement to the bolt threads only after the loose washer has passed onto the asymmetrical portion of the bolt shank. This will assure that the nut cannot jam the washer against the asymmetrical bolt shank if the washer is not properly aligned.

2. The special cam bolt assembly of claim 1, wherein the said threaded area is round and undisturbed.
3. The fastener assembly of claim 1, wherein the said asymmetrically formed area is integral to the shank of the bolt.
4. The special cam bolt assembly of claim 1, wherein the asymmetrical form is recommended to be 4 sides of a hexagon with two adjacent sides unformed.
5. The special cam bolt assembly of claim 1, wherein the asymmetrical form as described in #4 allows the loose washer to be installed with either side going on first with proper radial alignment to the asymmetrical bolt shank assured.
6. The special cam bolt assembly of claim 1, wherein the length of the undisturbed threads on the bolt is variable as necessary to fully tighten and secure this cam bolt assembly to a specified mating structure.
7. The special cam bolt assembly of claim 1, wherein the formed area of the bolt shank is variable in length to allow the loose cam washer to slide up to and be tightened against a specified mating structure.
8. The special cam bolt assembly of claim 1, wherein the special nut has an integral recess that prevents the threads of this nut from engaging onto the bolt threads until the nut has pushed the loose eccentric cam washer onto the asymmetrical bolt shank.
9. The special cam bolt assembly of claim 1, wherein the attachment of the special nut as described in #8 will eliminate the possibility of binding or jamming of the washer between the asymmetrical bolt shank and the nut when attempting this assembly.
10. The special cam bolt assembly of claim 1, wherein the special deep recessed nut will have an integral hexagon formed on the end to facilitate tightening of the nut to secure this assembly to a specified mating structure.
11. The special cam bolt assembly of claim 1, wherein when the bolt is rotated the dual eccentric cam washers will move in unison.
12. The special cam bolt assembly of claim 1, wherein the bolt may be rotated providing a pivot for the eccentric cam washers to generate adjustment for an automotive suspension assembly.

13. The special cam bolt assembly of claim 1, wherein an automotive suspension assembly utilizing this unique cam bolt assembly as designed may be loosened, re-adjusted and retightened at any time.
14. The special cam bolt assembly of claim 1, wherein the special bolt, special cam washers and the special deep recessed nut are each to be manufactured of steel.

DESCRIPTION

BACKGROUND OF THE INVENTION

Cam bolt assemblies provide a means of controlled adjustment in automotive suspension components. It has been widely known and common to have a bolt with one cam securely attached beneath the head, the bolt having a flat side and providing a second cam with an opening corresponding to the cross sectional area of the flat sided bolt, this cam being placed over the end of the bolt and by using a standard nut these cams are drawn tightly against the surfaces that they engage.
This traditional style of providing positive location of the cam radially by striking or machining a flat or groove on the threaded area of the bolt has been in use for many years now. There are a number of patents pertaining to cam washer assemblies of this style that are in use for alignment and adjustment of automotive suspension systems. It is very desirable to have a bolt and cam washer assembly that provides foolproof installation, with simple shape configuration for elimination of secondary machining or forming operations and no distortion of the bolt threads.

SUMMARY OF THE INVENTION

The present invention generally relates to a cam bolt assembly with a unique asymmetrical form on the shank of the bolt that does not affect the threaded portion of the bolt. The threaded portion of the bolt end is free of any locating flats or grooves that would compromise the strength

of the threads. The asymmetrical form area begins at the conclusion of the threads and continues up the shank of the bolt far enough to receive the loose cam washer completely when the bolt & nut is tightened to secure the structural assembly. The shape of the asymmetrical form area will be equal to the outside diameter of the threaded area of the bolt when measured across its narrowest point. This form area will have several facets, contours or lobes that are raised above the maximum outside diameter of the bolt threads to engage and locate the loose cam washer. This same shape will be stamped through the loose cam washer. The shape allows the loose cam washer to be slid over the threaded area of the bolt and once rotated to match the asymmetrical form on the bolt shank will engage smoothly. The asymmetrical form pierced in the loose cam washer will allow installation to the bolt from either side of the washer with no change in orientation. The nut configuration is unique in that the first threads of the nut are recessed deep into the nut body. This depth is engineered to allow the bottom of the nut to push the loose cam washer over the asymmetrical form on the bolt shank before the threads of the nut engage the threads of the bolt. This recess depth on the nut is calculated as follows:
NUT RECESS = BOLT THREAD LENGTH MINUS LOOSE CAM WASHER THICKNESS PLUS TWO TIMES THREAD PITCH OF THE BOLT SELECTED
This prevents the nut threads from engaging before the loose cam washer is properly oriented and causing the washer to jam between the nut and the asymmetrical bolt shank area. The diameter of the nut recess area at a minimum will be sufficient to pass over the asymmetrical formed shank area of the bolt upon nut rundown.

BRIEF DESCRIPTION OF THE DRAWINGS

Other advantages of the present invention will be readily appreciated, as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 a general perspective view of the fastener assembly of the present invention.

FIG. 2 a view of the end of the bolt showing the thread diameter and its relationship to the asymmetrical formed area.

FIG. 3 a silhouette view of the new type cam bolt and washer assembly (partially sectioned) showing the relationship between the nut recess, the first threads of the bolt, and washer engagement to the asymmetrical form on the bolt shank at the beginning of assembly.

FIG. 4 a silhouette view of the new type cam bolt and washer assembly (partially sectioned) showing the relationship between the nut recess, washer engagement and nut recess clearance over the asymmetrical form on the bolt shank during assembly.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The unique design features of a cam bolt assembly of the present invention are generally shown in FIG. 1. The special cam bolt 1 possesses a knurl under the head by which a cam washer is press fit onto after having been located radially to the asymmetrical shank section 10 of the bolt. The threaded end of the bolt 11 is round with no distortion to its circumference from flat areas, grooves or shapes. The special asymmetrical formed area of the bolt shank 10 is described in better detail in FIG 2. This shape 5 (FIG 2) is shown as form of four sides of a hexagon but could be realized in other shapes with positive results. This shape 5 (FIG 2) ideally has flat surfaces that at their smallest point are equal and not larger or smaller to the outside diameter of the threaded area of the bolt. This shape is matched in the flat cam washer 3 (FIG 1) which has a pierced hole that matches the asymmetrical shank area 5 (FIG 2) of the cam bolt 1 (FIG 1).This will allow washer 3 (FIG 3) to spin on the threaded area of the bolt in perfect alignment to the asymmetrical area of same bolt until the asymmetrical pierce in the washer matches up with this area of the asymmetrical of the bolt. Upon engagement to the asymmetrically formed shank 10 of bolt 1 the loose cam washer 3 will be aligned radially with fixed washer 2 and will rotate in unison with fixed washer 2 when cam bolt 1 is turned (FIG 1). The special design nut 4 (FIG 3) has a deep recess that is engineered to

prohibit nut thread to bolt thread engagement 7 until loose cam washer 3 is aligned radially to the asymmetrical shank of cam bolt 1 and passes partially onto this shank area 10 (FIG 1). Upon radial alignment and engagement 8 of washer 3 to the asymmetrical shank of the bolt (FIG 4) the threads on the special nut are allowed to engage with the bolt threads 9 to push the washer along the asymmetrical bolt shank 8 as the joint is tightened. Because no distortion or damage has been made to the threaded area of the bolt this unique cam bolt assembly can be tightened to full published specification for the fastener size selected. Further, there is no need go to an "oversize" fastener to meet clamp load / proof load requirements of the application.

Cost per joint can be saved because it is not necessary to select a larger cam bolt size to compensate for the thread modifications that are present on more traditional designs. This unique design further saves cost by not requiring secondary machining operations to apply shape to the cam bolt. All forms and contours that are specified in the asymmetrical 5 (FIG 2) bolt shank area 10 (FIG 1) can be produced in the same process and at the same production rate as a standard bolt (using specially modified tools). This special cam bolt assembly design is intended to be applied in all fastener sizes and in any location that currently benefits from the use of traditional cam bolts assemblies.

[57] **ABSTRACT**

This design will describe an improved apparatus for providing alignment adjustment on automotive suspension members. The positive attachment and adjustability is provided by the unique design of each assembly component and the engineered relationship to its mating part. This design features a short length of asymmetrical form that is integral to the bolt shank but does not damage or distort the threaded area of the bolt. A cam washer is pressed onto and locked under the head of the bolt. This eccentric cam washer is secured relative to the asymmetrical bolt shank. A second eccentric cam washer is then installed which positively engages on the asymmetrical area of the special bolt shank. This design features a specially developed nut with a deep recess before the start of threads. This recess assures that the bottom of the nut pushes the second cam washer onto the asymmetrical shank area of the bolt before the nut threads engage the bolt threads. Both eccentric cams can now move in unison with the rotation of the bolt to provide adjustment. Once the required adjustment is achieved the special nut can be completely tigntened to secure this adjustment. While other designs provide similar adjustment using eccentric cam washers each of these designs locate the washers by distorting or destroying the threaded area of the bolt. Some methods roll threads onto the round bolt shank and then machine a flat across the threaded area to provide a "D" shaped area for a cam washer with a "D" shaped pierced hole to engage. Another common method stamps a groove on the bolt shank prior to threads being rolled on this area and a washer with a similar pierced shape is engaged. Both of these methods compromise the threaded portion of the bolt. This weakens the threaded area reducing clamp load and proof load on the joint. To overcome this thread area weakness fasteners are typically specified in a much larger size to withstand loads adding to the cost of this type of joint assembly. The proposed special formed bolt, asymmetrically pierced washer and special clamping nut allows for simplified manufacturing methods, and a significant reduction in tooling complexity and costs.

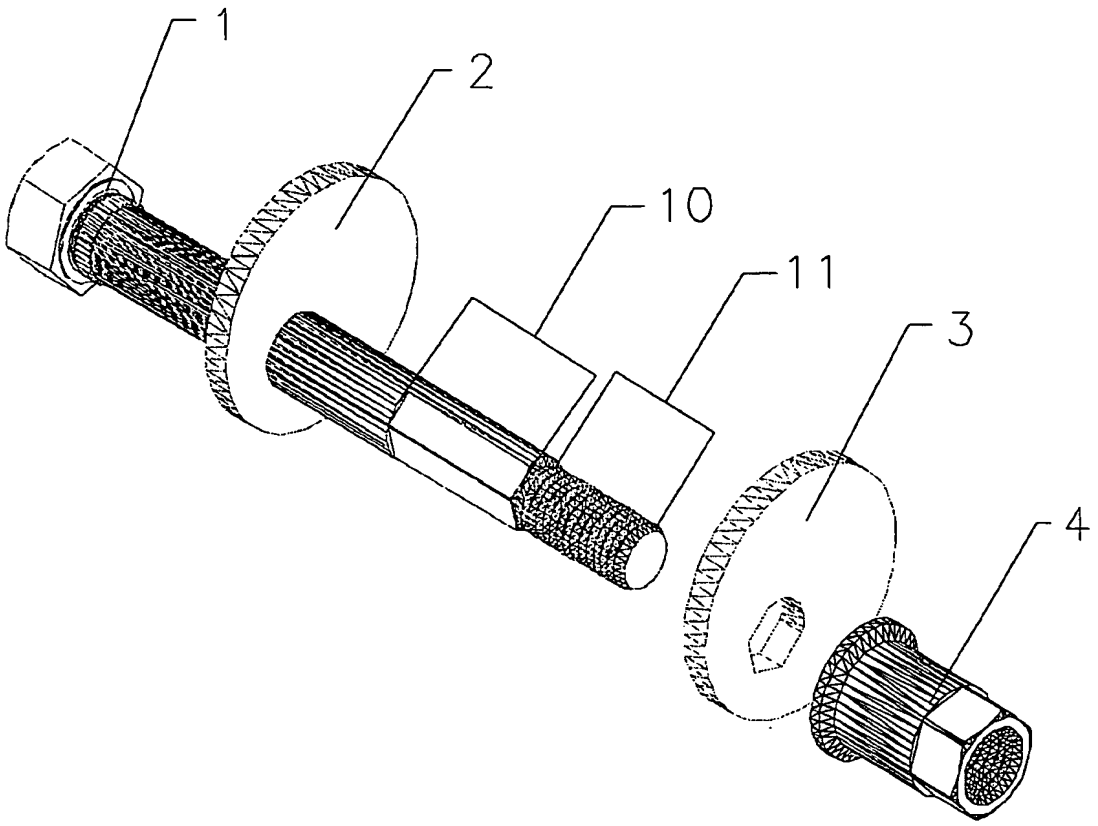

FIG 1

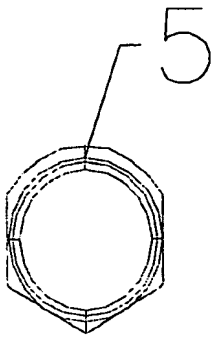

FIG 2

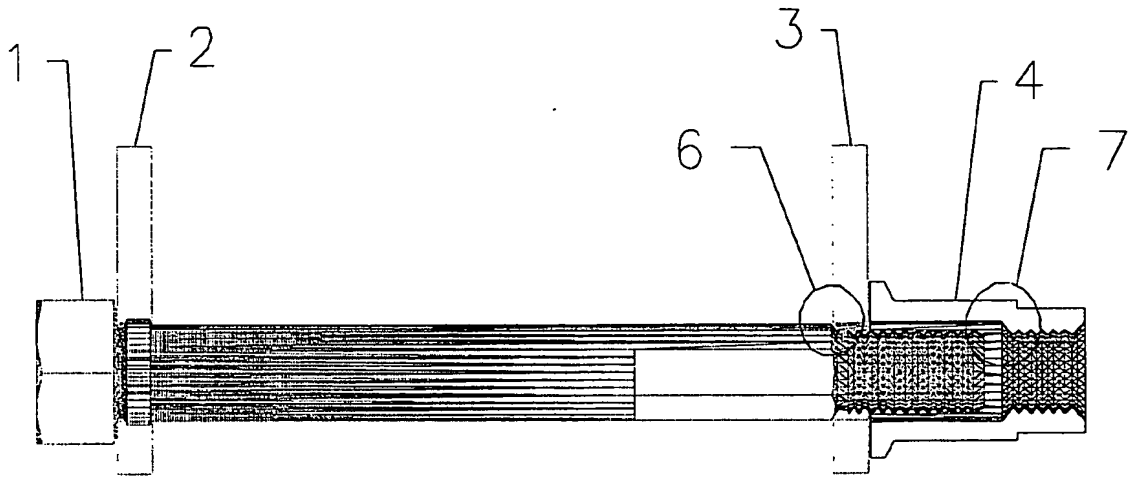

FIG 3

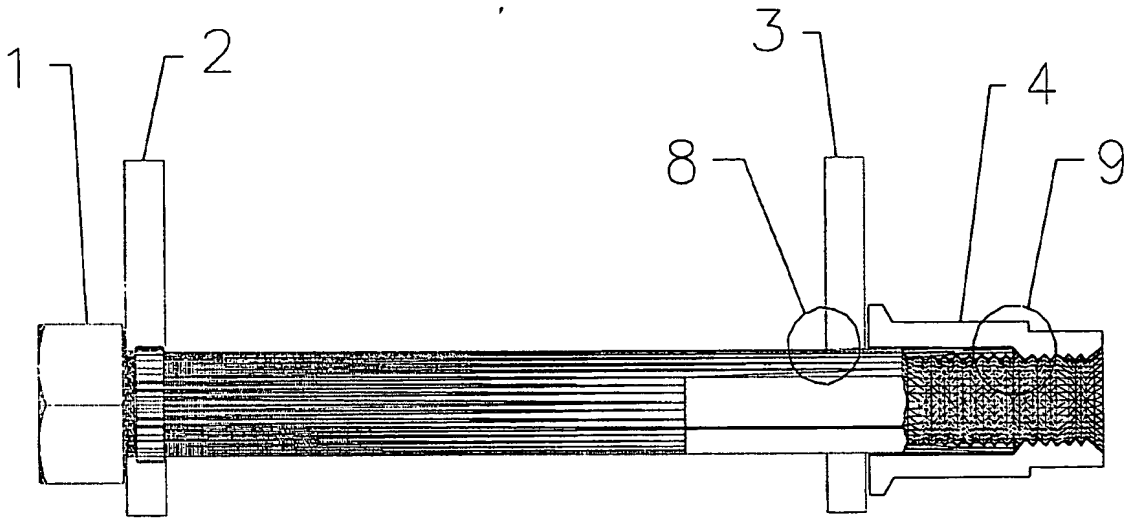

FIG 4

Document made available under the Patent Cooperation Treaty (PCT)

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